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RANGE IMPROVEMENT



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NOTES

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FOREST SERVICE — U. S. DEPARTMENT OF AGRICULTURE
INTERMOUNTAIN REGION — OGDEN, UTAH

STATEMENT OF PURPOSE

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This publication is printed primarily to inform professional range administrators of important range improvement and management developments and findings. These "NOTES" may include extracts of published papers, unpublished preliminary reports of research work, unpublished reports on administrative studies and personal observations or suggestions of other range administrators. No claim is made as to the accuracy or completeness of studies or conclusions drawn.

All who read these RANGE IMPROVEMENT NOTES are encouraged to submit material for publication, or suggestions for improving its usefulness. Full credit will be given for any material used.

HOW MANY SERVICEBERRY = ONE DEER?

By
L. Jack Lyon*

When the snow is deep and the weather turns rough, there's nothing quite so satisfying as a belly full of serviceberry twigs--if you're a deer, that is.

In food habits studies, serviceberry is usually rated as an "ice cream" food because the animals like it so well. On many ranges it is the key species that insures winter survival of Montana deer.

Last year we got to wondering how many plants it takes to supply the belly full of twigs that makes for a happy deer--or more important--how many plants it takes to keep a deer alive when the snow is 3 feet deep and it's forty below. This is a complicated question because serviceberry plants come in all sizes and shapes and no two deer are exactly alike. Obviously, there isn't any single answer, but the information we collected does supply at least a partial answer. Would you like to make a guess before you read the rest of this article?

The shrub - How much does a serviceberry produce?

In the fall of 1964, we set out to determine just how much forage a serviceberry plant produces. The sample consisted of 110 plants on 11 different sites. Plants ranged from 18 inches to 12 feet in height and the sample areas were scattered over a wide variety of ranges. Overall the sample was considered pretty much representative of serviceberry plants and the places they grow in western Montana.

After the growing season was over, the 1964 growth was clipped from all 110 plants with garden shears. Clipping was limited to those twigs over 1 cm. long, including the bud. The twigs from each plant were oven dried and weighed.

The healthiest shrub which, incidentally, was not the largest, produced 349 grams of new twig growth; but the second most productive plant had only 95 grams. The overall average for 110 plants was 16.3 grams; but the two best plants in each sample produced a combined average of 52.1 grams while the two poorest plants had an average yield of only 1.3 grams. Reduced to more meaningful terms, it takes nearly 28 of these "average" serviceberry plants to produce a pound of oven-dry twigs.

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The belly full - How much does a deer need?

What, then, is a belly full? A number of studies of deer food requirements have been reported, and the results all point to about the same conclusion. Arizona deer can get along on about 2.2 pounds of air-dry native forage per day for a 100-pound deer (Nichols, 1938). In Michigan it takes 2.65 pounds, but the deer lose weight (Davenport, 1939); and in Wisconsin 3.5 - 5.5 was reported as the proper figure (Dahlberg and Guettinger, 1956). Closer to home, Hill (1956) suggests that a 140-pound mule deer ought to have about 4-5 pounds of air-dry forage a day; and Schwan and Swift, (1941) consider 5 pounds a good average for deer in the rough terrain and deep snow of most western ranges. Oven-dry is a little lighter than air-dry, but 4 pounds of forage for a 150-pound Montana deer¹ seems like a fair estimate.

How much is that? Well, as an aid to visualizing 4 pounds of serviceberry twigs, consider this:

The average weight of a single twig was 222 milligrams.

The average length was 95.68 mm.

A plant producing 16.3 grams of forage has over 23 feet of new growth,

And 4 pounds of serviceberry twigs would stretch out nearly half a mile.

How many plants equal a belly full?

Eating 4 pounds of twigs a day, it appears that each deer will have to visit 111 serviceberry plants to get a belly full of twigs. Unfortunately, this is not the full story. Although there are plenty of winter ranges where every bit of the annual growth (and then some) is taken by deer, serviceberry just can't stand that kind of abuse indefinitely. In the long run, Montana range managers think 60 percent utilization is about the maximum the shrub will tolerate. Our poor old deer is beginning to look well traveled. At 60 percent utilization he will have to visit 186 plants to get his 4 pounds of twigs!

In actual fact, it's unlikely that any deer really uses 186 serviceberry plants a day. Montana deer are smart enough to recognize that it just doesn't pay to look for lunch on a range where they ought to be carrying a sandwich in a packsack.² Instead, you'll find them concentrated in places where 25 grams per plant is an average production figure. More than that, they'll probably ignore the little plants and concentrate on mature shrubs producing 45 grams or more. Even so, collecting a belly full of twigs is going to be quite a job. If only 60 percent of the annual growth is utilized, it takes about 67 mature serviceberry plants to feed a deer for one day.

¹Naturally, Montana deer are just a little bigger.

²I know some hunters who will tell you they're smart in a number of other ways too.



Management Implications

A little simple multiplication on this figure produces some pretty startling results. Eating the annual growth of 67 mature serviceberry shrubs a day, a deer requires nearly 25,000 plants each year. The astronomical number of mature shrubs required to support all of Montana's deer is neither believable nor possible; but it does lead to some important implications for the deer and for land managers interested in producing and maintaining deer habitat.

First, it seems obvious that Montana deer are going to have to settle for something less than serviceberry "ice cream" for every meal. It simply would not be possible to devote enough land to this particular shrub to feed all the deer. No one has had an opportunity to check with the deer on this, of course, but it does seem unlikely that they would object.

Second, the meat and potatoes portion of the deer diet is going to have to consist of plant species a little more productive than serviceberry. A number of studies have confirmed that this is possible. Investigators in California, for example, have found that a mature bitterbrush produces around 200 grams of leader growth in a year (Hubbard, Sanderson and Dunway, 1960).

Finally, management favoring serviceberry should be considered more important on winter range areas than in summer habitat. Forbs and herbaceous material provide a significant proportion of the deer diet when there is no snow, but browse becomes critical when other plants are covered. Serviceberry may be the only food available when the snow is 3 feet deep and it's forty below, and any deer will tell you that's important.

Next time you're in the woods salute the lowly serviceberry. It may take 67 of them to provide a satisfying belly full--but where else can you get ice cream in 67 flavors in the dead of winter?



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* * * * *

Some teachers petrify at forty;

Others are at their best in their seventies.

--G. B. Harrison

GAME FORAGE RESTORATION

By

Perry Plummer, ** Steven Monson, * and Donald L. Christensen*

Closed stands of juniper-pinyon in Utah produce from practically 0 to 150 pounds (field weight) of forage per acre. Restoration of such ranges by juniper-pinyon eradication and seeding of desirable grass, forb, and browse species have resulted in greatly increased forage production for deer and livestock.

On a 4,000-acre tract in central Utah, there was a sevenfold increase in forage production 3 years after treatment. Forage increased from about one hundred pounds per acre to an average of nearly seven hundred pounds per acre. Deer-day use per acre averaged 4 deer days on untreated juniper stands and 83 deer days of use per acre on seeded areas 3 years after treatment - about a twentyfold increase (table 1). Deer were attracted to the seeded areas from adjacent untreated range. This is heavy deer use, but such use apparently has not damaged the forage plants; likely it would if continued over a period of years. Average deer use of seeded range over the State is much less than reported here, but greatly increased grazing capacity appears possible on many thousand acres of critical deer winter range by using artificial measures for improvement.

Table 1. Herbaceous and shrub yield, ground cover, and deer days of grazing on seven sites 3 years after restoration compared to untreated juniper-pinyon range.

<u>Site</u>	<u>Production</u> (Pounds/acre)	<u>Ground Cover</u> (Percent)	<u>Deer-day Use</u> (Per acre)
West slope	591	69	89
South slope	514	60	66
North slope	941	75	149
East slope	832	71	94
Ridgetop	583	71	81
Open Flat	680	84	75
Canyon Bottom	708	86	28
Average for seeded area	693	73	83
Untreated J-P area	100	35	4

Forage on seeded areas was available earlier and was more palatable than that on untreated range. The adequate supply of green forage on seeded areas during the critical early spring period, when fetuses are developing

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rapidly in pregnant does, is of special value. The improved forage reduces winter and early spring mortality and increases fawn production. Seeded ranges have also been especially helpful in keeping deer off from cultivated land.

Also, livestock grazing capacity on restored areas was increased greatly. Untreated range with dense stands of juniper-pinyon is practically worthless as cattle range. About 4 acres of seeded range will support one cow per month without undue interference with deer use. A fee of about \$2 per AUM (based on competitive bid) is now being charged for cattle spring grazing on some restored ranges owned by the Utah State Department of Fish and Game. The improved range furnishes high-quality forage.

Watershed values are greatly improved when juniper-pinyon range is restored. Closed stands of juniper-pinyon have large, bare soil openings, and cover is inadequate to protect the soil.

Ground cover averages 35 percent on untreated areas of dense juniper, as compared to 73 percent on improved and seeded areas (table 1). Such cover has stabilized the soil. Restoration programs can be applied to approximately 13 million acres in Utah alone. Thus, returns from our research will be multiplied manyfold.

* * * * *

Sin is a queer thing.

It isn't the breaking of divine commandments.

It is the breaking of one's own integrity.

--D. H. Lawrence

* * * * *

SAFETY is a year 'round job.



STABILIZING DISTURBED AREAS

The descriptions of three grass species outlined below were prepared by the Soil Conservation Service. The three species, Sodar Wheatgrass, Fairway Wheatgrass, and Durar Hard Fescue, are relatively unpalatable to livestock. The primary use of these grasses has been for revegetating and stabilizing disturbed areas such as road rights-of-way, embankments, skid trails, airports and ditchbanks.

SODAR Wheatgrass - A drought-resistant turf grass Agropyron riparium Scribn. and Smith

Origin

An improved native sod-forming wheatgrass collected near Canyon City, Grant County, Oregon, in an area of approximately 12 inches annual precipitation. Released in 1954 by the Soil Conservation Service and the Idaho and Washington Agriculture Experiment Stations.

Description

Although commonly called riparium or streambank wheatgrass, Sodar has excellent drought tolerance. Its short growth form, vigorous sodding ability, narrow lax leaves, seedling vigor, and longevity contribute to its excellence as an erosion control plant. It produces numerous stems and seed heads during the first 2 to 3 years, or until it becomes fully sodded, thereafter seedhead formation practically stops. Seed heads are mostly awnless and seed shatters readily at maturity. It established easily from seed and does not become a weed. Mature plants are easily killed by normal tillage operations.

Adaptation and Use

Sodar wheatgrass was selected and released as a special use grass for erosion control seedings within the semidesert or better soil zones and on irrigated lands. Forage yields are very low. It establishes and produces good sod in areas with 6 inches or more rainfall. Soil adaptation ranges from shallow to deep, moderately coarse to fine textured and moderately saline to slightly acidic. Once established, it provides an excellent barrier to weed invasion. It can be used on airport interspaces, road rights-of-way, fence rows, ditch and canal banks (lined or unlined), reservoir embankments, nonirrigated playgrounds, farmyards, and as a cover crop in windbreaks and orchards. Its use in waterway seedings has not been consistent, many seedings have washed out prior to establishment. Sodar is crowded out if the site is too wet. Seed can be produced under irrigated and dryland conditions with yields ranging from 100 to over 600 pounds per acre for 2 to 3 years.



Seedbed

A good, firm, weed-free seedbed is essential to the full success of the seeding. Most areas left bare following construction are weed free and can be seeded in the late fall or early the first spring following construction.

Seeding

Seeding rates of 10 pounds per acre have been satisfactory. Nonirrigated seedings in the 12 inches or less precipitation zone should be done in late fall by drilling. Spring seedings establish well in the better moisture zones, or if irrigated. If a drill cannot be used, the seed may be broadcast and raked or harrowed in. Depth of planting should not exceed 1 inch. Seed fields should be planted in 36-inch rows at 3 pounds per acre.

Pure live seed requirement for ACP is 75%.

Seed weighs 22 pounds per bushel.

There are 170,000 seeds per pound.

At 10 pounds per acre in 6-inch drill rows, there are 16 seeds per foot of row

If broadcast at 10 pounds per acre, there are 40 seeds per square foot.

Management

New seedings should be given full protection until completely established and a minimum stubble height of 3 to 4 inches maintained thereafter. Do not spray with 2,4-D until plants have 6 or more leaves. Nitrogen applied at 20-40 pounds per acre will aid establishment on low fertility sites in the 8 inches or better precipitation zones. Cultivate seed fields to keep the grass in rows to maintain maximum seed yield.

Seed Source

1965 Seed Producers

R. R. Archibald	Rexburg, Idaho
Emmet Bauer	Hazelton, Idaho
Christman A. Hopkins	Soda Springs, Idaho
George Hedlind	Rupert, Idaho
Garnett Kidd	Burley, Idaho
Robert Knuth	Rupert, Idaho
Tetonia Branch	
Experiment Station	St. Anthony, Idaho
Jacklin Seed Company, Inc.	Dishman, Washington

Inquire - Plant Material Center, Aberdeen, Idaho, for other seed sources.

FAIRWAY Wheatgrass - For Erosion Control
on Embankments, Berms, and Rights-of-Way

Fairway Crested Wheatgrass
Agropyron cristatum
(L.) Gaertn.

Origin

Introduced from Russia, Siberia and Turkey as early as 1898; however, the most important introductions were made about 1934 or later.

Description

Fairway crested wheatgrass compared to standard crested wheatgrass (*Agropyron desertorum*); Fairway plants are uniformly shorter, leafier, lighter green, finer stemmed and earlier in maturity. The seed heads of Fairway are shorter, wider-based with a sharp taper to the tip and the awns are longer and more numerous than on standard crested wheatgrass. Growth starts about the same time as standard crested wheatgrass in the spring, but Fairway will cure earlier and produces less vegetative growth. Fairway has good seedling vigor and drought tolerance. Though generally characterized as a bunch grass, Fairway crested wheatgrass has a weakly sodding form of growth.

Adaptation and Use

Best performance is on well-drained loam soils in areas that receive 10 inches or more precipitation each year. It is used mainly in erosion control seedings of critical areas and in the revegetation of denuded areas such as reservoir berms, debris basin embankment and pool areas, highway rights-of-way, airports, golf courses, nonirrigated play areas, etc.

Seedbed

A clean, firm, weed-free seedbed is essential. In low precipitation areas, good stands can be obtained by fallowing for a year and controlling weeds to conserve moisture. Seedbed should be firm to obtain uniform depth of seeding in areas that will be planted by drilling. Areas where the seed will be broadcast should have about 1/2 inch of loose soil above firm soil. Seed can also be drilled or broadcast in burned areas without additional seedbed preparation. Seed prior to the germination of undesirable plants.

Seeding

Fairway seed should be drilled, if possible, or where drill rows are not objectionable. Plant 10 to 15 pounds per acre when drilled for erosion

control. Deep furrow drills have consistently produced the best grass stands. Where a hydroseeder is used to apply the seed and a mulch cover is provided, the seeding rate will vary from 10 to 20 pounds per acre depending on site conditions and seedbed. The seeding rate for broadcast seedings will vary from 15 to 30 pounds per acre depending on purpose of the seeding and site conditions. The higher seeding rates result in dense plant populations in which the plants are dwarfed, less vigorous and provide a quick protective cover. Late fall seedings are best in areas receiving 12 inches or less precipitation. Spring seedings are better in the higher precipitation zones or where soils crust or frost heave.

Pure live seed requirement for ACP is 75%.

Seed weighs 22 pounds per bushel.

There are 175,000 seeds per pound.

At 6 pounds of seed per acre in 6-inch drill rows, there are 12 seeds per foot of drill row. If drilled for erosion control, the area should be double-drilled at the 6-pound rate.

At 30 pounds per acre, broadcast, there are 120 seeds per square foot.

Management

Nitrogen applied at 20 to 40 pounds of N per acre will assist in stand establishment. Do not spray with 2,4-D until after the plants have 6 or more leaves. Mowing should be delayed until after late seed milk stage. Stubble should be 3 to 4 inches high. Occasional applications of nitrogen fertilizer will be needed to maintain stand and plant vigor.

Seed Source

Available commercially.

DURAR Hard Fescue - A Versatile Conservation Grass

Durar Hard Fescue

Festuca ovina var. durfuscula

(1) Koch

Origin

Collected from an old planting on the Eastern Oregon Livestock Experiment Station at Union in 1934. Developed by reselection at the SCS Plant Materials Center, Pullman, Washington. Released cooperatively in 1949 by the Soil Conservation Service and Agriculture Experiment Stations, Washington, Oregon, and Idaho.



Description

Medium tall, semi-erect, long-lived, densely tufted bunchgrass. It is a large form of sheep fescue and closely related to Chewings fescue. It has broader, longer, coarser, more lax leaves than sheep fescue. It is more drought tolerant than Chewings fescue but not as hardy as native sheep or Idaho fescues. It is a heavy root producer. This plus its abundant dense leaves and low crowns make it an excellent erosion control plant. It is a good seed producer, seedling vigor is low.

Adaptation and Use

Durar is adapted to a wide range of soil conditions in areas of 12 inches or more annual precipitation. Performance is best on well-drained soils. It will not tolerate "wet feet" or saline-alkali soils, but does well on low fertility sites and in shaded areas. It has not been accepted as a companion grass to alfalfa or clover for hay even though it does not reduce hay yields, and its massive root system contributes large quantities of organic matter. The dense mass of relatively tough leaves makes mowing difficult. It is not readily grazed by livestock. Its primary use has been for soil protection on roadsides, ditchbanks, airports, skid trails in the higher rainfall zones, and as a cover crop in irrigated orchards and windbreaks.

Seedbed

A firm, moist, weed-free seedbed is essential. Good emergence and full stands are dependent upon adequate moisture near the soil surface until the root system is established. Establishment is slower and more difficult than for Sodar wheatgrass and for this reason more care needs to be taken in preparing a good seedbed and in seeding properly.

Seeding

Seedlings emerge and develop slowly. The seeds are small and should not be planted more than 1/2 inch deep. Drill 5-7 pounds of seed per acre. Drilled seedings have been most successful although broadcast seedings at 10 pounds per acre, harrowed or raked in, have worked well on sites too rough to drill. Spring seedings have been consistently more successful than fall seedings. Seeding should be done as early in the spring as possible on drylands.

Pure live seed requirement for ACP is 80%.

There are 680,000 seeds per pound.

At 6 pounds of seed per acre in 6-inch drill rows, there are 48 seeds per foot of drill row.

When broadcast on rough ground at 10 pounds of seed per acre, there are 156 seeds per square foot.

Management

Irrigated seedings should be watered every 4-7 days until plants are well established. Weeds can be controlled by clipping prior to seed set, or by spraying with 2, 4-D at 2 pounds of acid per acre after the plants have 6 or more leaves. Once established, Durar acts as an effective barrier to weed invasion. Maintain 2-4 inches stubble for soil protection.

Seed Source

Available commercially.

* * * * *

Ours is a government of checks and balances.

And the more checks the government

writes, the worse the balance

gets.

--Harry Karns in Garden City, N. Y.,
NEWSDAY

Holding public office is like trying to dance in

a nightclub.

No matter what you do, you rub some-

body the wrong way.

--Franklin P. Jones in
Philadelphia BULLETIN MAGAZINE

The Effects of Big Game and Cattle Grazing on Aspen Reproduction

Abstract from Master Thesis by

Floyd H. Coles, B. Y. U. - 1965

The quaking aspen type occupies a large portion of the forested areas of Utah, and is important summer range for both big game and livestock. Lack of adequate aspen reproduction within these stands constitutes a major problem in the management of aspen stands throughout Utah. The objective of this study was to determine the effects of different intensities of grazing by big game and by cattle, and the combined effects of both on aspen regeneration.

Eighteen study areas were selected throughout the state and each of these areas were subdivided into two- or three-acre sized sampling areas upon which the following data were taken: damage to aspen reproduction, density, diameter, age and height of aspen reproduction, and utilization by species and classes of forage. The data were subjected to multiple regression analyses to determine the relation of the various factors to survival and successful regeneration of aspen.

Presence of desirable forage, both grasses and forbs, appear to influence grazing damage to aspen reproduction. Presence of desirable forbs is the more important of the two, the reason being that if palatable forbs are in adequate supply, aspen will not be browsed extensively by either big game or cattle. If better forage is scarce animals may be forced to eat the less palatable aspen.

Big game animals were directly responsible for most of the damage to the young aspen. Cattle grazed the aspen when more palatable forage was insufficient to supply their needs. Cattle were important, however, as an indirect factor by depleting the palatable forage, and thus causing an increase in use of aspen by big game animals. The combination of both high numbers of big game and high numbers of cattle resulted in excess damage to aspen reproduction. Big game overgrazing with or without cattle also resulted in serious damage to aspen reproduction. Aspen reproduction can be insured with moderate grazing intensities of both big game and cattle if palatable forage is adequate.

All stands studied contained some mature trees and were uneven aged. Past history of these stands, as indicated by aspen age class distribution, show all age classes well represented--even during periods of maximum cattle grazing--until the buildup of large deer herds during the 1930's and 1940's. Aspen regeneration in many stands has been, and continues to be, unsuccessful as a result of heavy browsing by big game or a combination of big game and livestock.

Average annual height growth (excluding current growth) is the best measure of damage to aspen reproduction over a period of several years. Sprouts which average only 0.4 feet or less in height growth, because of heavy browsing, die in a few years and are replaced by young sprouts. Aspen reproduction can be browsed moderately and still regenerate successfully. Guides to maximum allowable browsing are: (a) utilization not to exceed 45 percent of the current growth by late summer; or (b) browsing that will permit an average annual height growth of at least 0.5 foot per year.

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